Analysis of Confucius's Humanistic Education Theory Centered on the Analects of Confucius Based on Cognitive Anthropology

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Objectives: Confucius's humanistic education theory centered on the Analects of Confucius based on cognitive anthropology was analyzed in this paper, and the computer technology was used to extract the imagery and thought of the ancient Chinese prose. Methods: First of all, the definition and classification of cognitive anthropology and ancient Chinese prose imagery were described in detail; then based on the Confucius culture centered on the Analects of Confucius, the computer representation model and the classification algorithm of ancient Chinese prose were constructed; Results:in addition, the experiment was carried out to verify the model and algorithm, and the threshold analysis was carried out on the basis of the comparison of tagged word and characteristic words; Conclusion: finally, the optimum range was obtained for each parameter.

Keywords:cognitive anthropology; ancient Chinese prose; vector space model
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Because of the limitation of the number of words in the ancient Chinese prose, there are a large number of allusions and metaphors in the work, these contents are often difficult to be understood by ordinary readers. So for a long time, people who study ancient texts are often experts and scholars who have profound attainments in this field, and these experts are knowledgeable and have a keen insight in some specific content appears in poetry [1]. However, multitude poetry works handed down for thousands of years in China. Traditional research method requires researchers to read a lot of knowledge, and then to do the work of reading, searching, recording, sorting and so on, so as to make analysis and statistics and finally make personal judgments, such a process is time-consuming and exhausting. Only those experts and scholars do the job, the workload is huge, and they may make an objective conclusion because of their preferences[2]. With the continuous development of computer science and technology, the use of computer technology to analyze ancient Chinese prose has attracted more and more attention. People also hope that by applying modern information technology to traditional culture, our excellent traditional culture can also be better developed in the contemporary era [3]. In this paper, some techniques for processing natural language in the computer are applied to the processing of ancient Chinese prose, and the techniques of data mining, machine learning and so on are combined, and this paper focuses on how to classify ancient Chinese prose by computer technology[4].

Cognitive Anthropology

Cognitive anthropology focuses on the thing what people know in different groups, and how this implicit knowledge can change people's perception of the world around them and establish a connection with the world [5]. From a linguistic point of view, cognitive anthropology uses language as a doorway to study cognition. The general goal of cognitive anthropology is to decompose language to explore the common nature of the way people perceive the world in different cultures. [6]. The cognitive anthropology has recently fallen into some plight of profound philosophical origin, and these dilemmas have prompted scholars to rethink "cognitive essence", after that, it has been no longer confined to the analysis of knowledge system, and has begun to enter a new comprehensive era, so as to bring new possibilities for cognitive anthropology by intersecting and drawing lessons from other disciplines such as psychology and cognitive science [7].

The Definition and Classification of Ancient Chinese Prose Imager

Imagery is an inherent concept in the ancient Chinese poetics and art theory. In particular, imagery refers to a "image" of "meaning", and it is a typical expression in Chinese ancient literature, it is usually to represent the subjective feeling of author through an objective object. Ancient Chinese prose pays great attention to the relationship between "meaning" and "image"[8]. Because of the unique characteristics of ancient Chinese prose, first of all, the use of words is extremely concise. For example, there are only 20 words in a five-character quatrain, in order to fully express the author's thoughts and feelings, every word is finally determined by the author after more consideration. As the ancient Chinese prose is extremely harsh to the use of words, it is not like other literary forms that can be expressed with sufficient ink. Therefore, there is little direct expression of emotion in ancient Chinese prose, the author often describes a picture to readers, and expresses the content that the author wants to express through this picture, which is the so-called "artistic conception" [9]. Such as Li Bai's A Tranquil Night known to every family: "moonlight before my bed; could it be frost instead? Head up, I watch the moon; head down, I think of home" [10]. There are 20 words in the whole poem, which shows to the reader a picture of a person sitting at the head of the bed and facing the moon outside the window, and most of the words in the poem are depicting the picture, until the last 3 words point out the theme of the work. The author describes the scene through the typical images, such as "moon" and "frost" in poetry, so as to express his own thoughts and feelings through the scene, and this feature is the unique feature of the ancient Chinese prose [11].

METHODS

Construction of Computer Representation Model of Ancient Chinese Prose Features

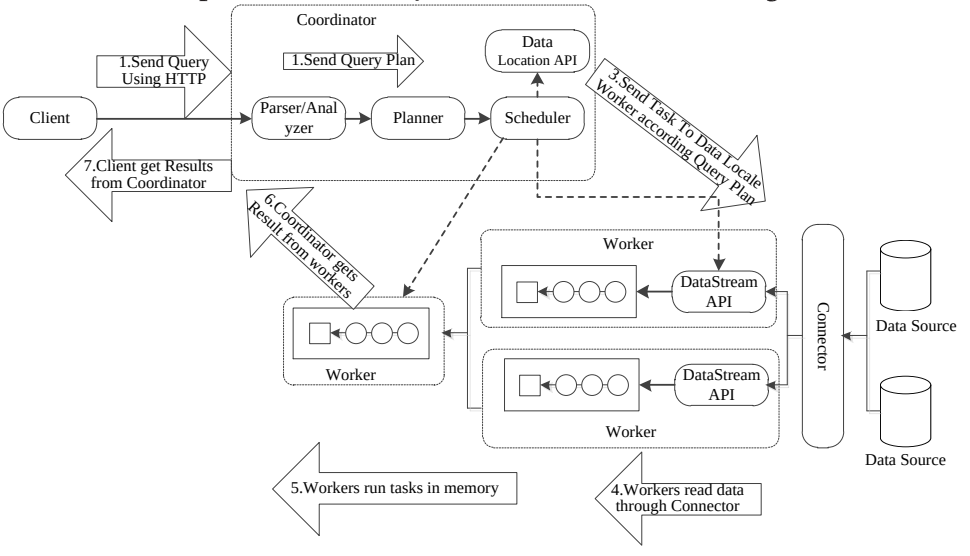
In the field of information retrieval, the vector space model (VSM) is the most widely used text representation model. The model was proposed by Salton and others in 1960s and successfully applied to the famous SMART text retrieval system in 1970s [12]. Currently, VSM has been widely applied in information retrieval, automatic indexing, text categorization and so on, and it is one of the most efficient and convenient models to represent text [13] In a simple way, the vector space model is to transform the content of the text into a vector, and it transforms the semantic similarity of the text into the similarity in the vector space, which is intuitive and easy to understand [14]. When each text is expressed as a vector, the similarity between the different vectors can be evaluated by calculating the similarity between each vector. Generally speaking, cosine similarity is often used to measure the similarity between vectors in computation [15]. There are several important basic concepts in the vector space model: the first is the text, text is an original article (which can be a sentence, a paragraph or a large amount of text). For example, in this article, the text refers to a classical poem [16]. The second is the feature term, feature term is the key item that is extracted from the original text and can represent the part of the original text. In general, feature items are both characters or words. When the feature is extracted, which is a component in

the vector space model, and the vector space model is made up of all the feature items [17]. The feature selection strategy is usually used to score the feature items, and there are many methods to select the strategy, such as TF-IDF, Information Gain and so on. The most suitable feature selection strategy can be selected according to the actual situation [18]. For example, the text d is represented as a vector space model, as shown in formula (1).

$$V(d)=(w_1,w_2,\ldots,w_n) \quad (1)$$

In which, d is a text, $w_i(1\le i\le n)$ is the weight value of the first i feature item in text in the text vector space, and its value indicates that the feature item represents the size of the text capability [19]. The specific steps of the model calculation are shown in the following figure:

Figure 1
The Steps of a Sexual Hybrid Recommendation Algorithm



Classification Algorithm of Ancient Chinese Prose

For a classification problem, it is a model of classification by using a sort of classification algorithm in the case of a set of data sets. The model set up should not only fit the relationship between the data category of the given training centralization and the data related attributes well [20]. The steps for solving the classification problems are as follows: first of all, the training set with typical representative ability is selected and the data in the training set is labeled; then a classification model is established on the basis of a training set; finally, the established classification model is applied to the unknown test set, and the test set is classified by the related classification algorithm. At present, there are many different classification algorithms. The most popular classification algorithms include nearest neighbor classifier, naive Bayes, classifier, support vector machine and so on. Even in the same category, the distance between the texts is different because of the difference between the test text and the training set. Therefore, in order to reduce the impact of the uneven distribution of text on the results as far as possible in the classification process, in this paper, a distance weighted nearest neighbor algorithm is used in the classification of classical poetry. The algorithm can effectively reduce the error caused by the uneven distribution of text, and its calculation formula is shown in the formula (2).

$$\mathrm{Sin}\left(D_c, d_j\right) = \frac{\sum_{i=1}^{k} \theta_{ij} dis\left(d_i, d_j\right)}{\sum_{i=1}^{k} \theta_{ij}} \quad (2)$$

In the formula (2), D_c represents the training set of category c; d_j represents the test text to be classified; d_i represents the text in D_c ; k represents the total number of text in D_c ; ϑ_{ij} represents the distance weighted value between the texts d_i and d_j , $\vartheta_{ij} = \frac{1}{dis\left(d_i, d_j\right)}$; $dis\left(d_i, d_j\right)$ represents the distance between the texts d_i and the d_j. The calculation formula of $dis\left(d_i, d_j\right)$ is as shown in formula (3):

$$dis\left(d_i, d_j\right) = \frac{\sum_{m=1}^{M} w_{im} w_{jm}}{\sqrt{\sum_{m=1}^{M} w^2_{im}} \sqrt{\sum_{m=1}^{M} w^2_{jm}}} \quad (3)$$

In the formula (3), i indicates the first i text in the training set; j represents the test text: m represents the first m dimension of the text vector; M represents the total dimension of the text vector; w_{im} and w_{jm} represent the first m weight weight of texts d_i and d_j, respectively. After the above calculation, the test text to be classified is included in the class that is most similar to it.

Support vector machine (SVM) is a new classification method compared with nearest neighbor classifier and Naive Bias classifier. In 1995, Vapnik and Cortes first proposed the theory of support vector machine. After that, support vector machine showed good results in solving nonlinear small samples. The idea of support vector machines is simply that there are many data points in an n-dimensional space, and a hyperplane needs to be found, this hyperplane can separate the data points, and it is the hyperplane with the maximum edge, as shown in figure 2 and figure 3.

Figure 2
Schematic Diagram of Support Vector Machine

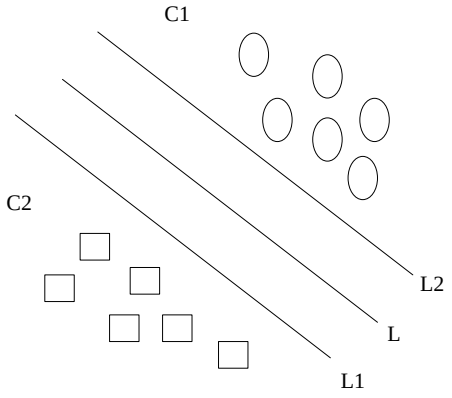
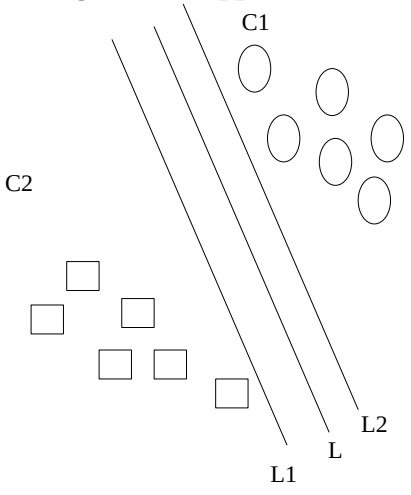


Figure 3
Schematic Diagram of Support Vector Machine



In figures 2 and 3, circles and squares represent two categories of data, respectively. In the middle, L divides space into two parts to form two parts of C1 and C2, which naturally divide different data into two parts. But the difference between figure 2 and figure 3 is that although both of the two diagrams can find L to divide the data into two parts, the distance from L to both sides of the data in figure 2, that is, the distance from L to L1 and L to L2, is obviously greater than the distance from L to both sides of figure 3, and this distance is called the edge distance. It is obvious that the classification with larger edge distances is better fault-tolerant. For example, when the data jitters, the impact on the classification is less.

Therefore, the classification of figure 2 is better than figure 3, and support vector machine needs to find a hyperplane with maximum margin distance. The category mark of the C1 section in figure 1 is set as 1, and the category label of the C2 section is set as 2. The equations of hyperplane L, L1 and L2 are formula (4), formula (5) and formula (6), respectively.

$$x \cdot w + b = 0 \quad (4)$$

$$x \cdot w + b = -1 \quad (5)$$

$$x \cdot w + b = 1 \quad (6)$$

In the formula, w and b are parameters that need to calculate the maximum edge distance from the data set, and they need to meet the following two conditions:

$$w \cdot x_i + b \geq 1 \quad (7)$$

$$w \cdot x_i + b \leq -1 \quad (8)$$

Formula (7) and formula (8) can be merged into formula (9):

$$y_i \left[(w \cdot x_i) + b \right] \geq 1 \quad (9)$$

Among them, y_i is the label value of different categories. At this time, the maximum edge distance is calculated, which is equivalent to the minimum value of the formula (10).

$$f(w) = \frac{\|w\|^2}{2} \quad (10)$$

At this point, the hyperplane that satisfies all the above conditions is the hyperplane needed.

RESULTS

Experimental Process and Results

In order to verify the effectiveness of the classical poetry classification model in this paper on the classification of the text of poetry, related experiments were carried out under different text models and different classifiers. The text data in this experiment originated from the Analects of Confucius. The evaluation standard used in the experiment was the classic evaluation index in the field of information retrieval, namely, the precision which was abbreviated as P, and the recall which was abbreviated as R. Assuming that there are 1 category in the text to be classified, the evaluation criteria for the $i(1 \leq i \leq 1)$ class are:

$$P_i = \frac{D_{CP_i}}{D_{P_i}} \quad (11)$$

$$R_i = \frac{D_{CP_i}}{D_{C_i}} \quad (12)$$

Among them: D_{C_i} is the number of the first i class text determined manually by the test centralized expert; D_{P_i} is the number of the first i class text determined by the algorithm; D_{CP_i} is the number of the first i class text determined manually by the test centralized expert and the algorithm. In order to verify the effectiveness of the classification model of artistic conception proposed in this paper for classical poetry classification, the experimental results of the feature item without clustering, FKC-VSM and the classification model of feature clustering in this paper were compared, and the experiment was carried out with three different classifiers (three classifiers included the nearest neighbor of the distance weighted, the support vector machine and the Naive Bias). The results of the experiment are shown in Table 1.

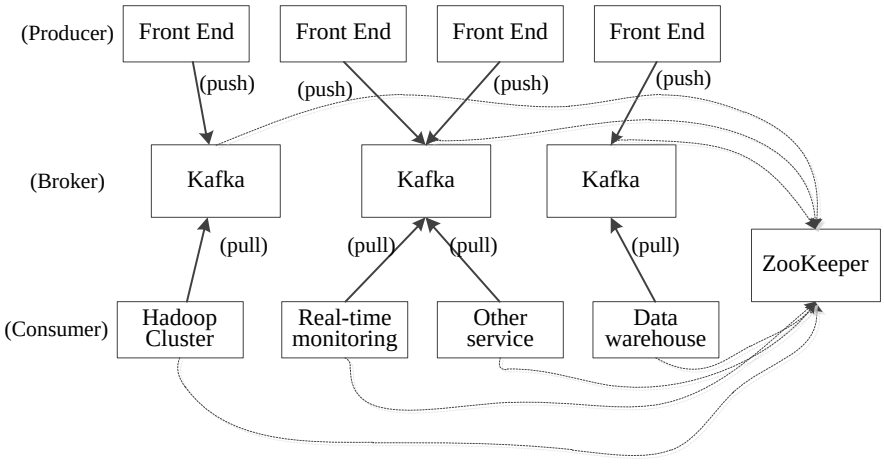
Table1
Experimental Results

classifier	Model	P/%				R/%			
		Brigades	Antiquity	Landscape garden	average value	Brigades	Antiquity	Landscape garden	average value
The distance weighted nearest neighbor	Not clustering	71.88	72.73	70. 97	71.86	71.88	75. 00	69.66	72. 18
	FKC-VSM	85. 46	87.88	90. 00	87. 78	88. 22	90. 63	84.38	87. 74
	clustering	90.91	93.94	96. 67	93.84	93. 75	96. 88	90.63	93. 75

Support vector machine	Not clustering	65.63	66. 67	64. 52	65.61	65. 51	68. 75	62. 50	65. 59
	FKC-VSM	80. 26	77. 28	77. 42	78.32	78. 13	81.25	75. 00	78. 12
	clustering	84. 38	84.85	83. 87	84.37	85. 47	87.50	80. 34	84. 44
Naive Bayes	Not clustering	60.61	63.64	63. 33	62. 53	63.88	65.63	59. 38	62. 96
	FKOVSM	73. 97	75.76	75. 67	75. 13	76. 74	78. 59	71.88	75. 74
	clustering	78. 79	81.82	83. 33	81.31	81.25	84. 16	78. 13	81. 18

From table 1, it can be seen that in the case of same classifiers, the classification model with feature clustering has higher accuracy and recall rate than non clustering and FKC-VSM. From the perspective of different classifiers, there is not much difference between naive Bias and support vector machine, but accuracy and recall rate are both lower than distance weighted nearest neighbor classifier. Therefore, combined with distance weighted nearest neighbor classifier, the classification model of the artistic conception of classical poetry in this paper has obtained satisfactory results in the experiment. In specific experiments, the flow of data is shown in the following diagram:

Figure 4
The Flow Chart of Data



Comparison Based on Tagged Words and Characteristic Words

The expression of modern Chinese is basically a unit of words. Unlike modern Chinese, the classical poetry is often written in words because of its concise words, and most of the mood can be expressed in one word. But considering the combination of words in the poetry, the results of tagged words and characteristic words were compared according to the previous summary and related research. Figure 5 shows a sample of

character items in the unit of words and terms.

Figure 5
A Sample of Character Items

Xing	The rise and fall
wind	strong wind
river	Jiangshan
ten thousand	a great distance
grass	Fragrant grass
shut	Man
Work	Fame
FLOWER	Apricot flower
Hou	create feudal lords
pavilion	Changting

As can be seen from Figure 5, most of the feature terms based on words are composed of many words on the basis of words. According to the conclusion in the previous article, the classification model of the classical poetry was adopted in this paper when the characters were based on tagged words and characteristic words, and the distance weighted nearest neighbor classifier was used to compare the results of the two. The results of the experiment are shown in Table 2.

Table2
Real Male Results Based on Tagged Words And Characteristic Words

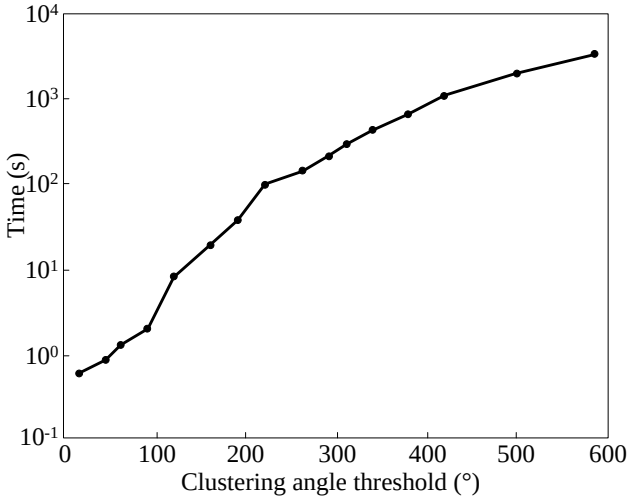
Feature term	P/%				R/%			
	Army cold border Brigade	Antiquity	Landscape pastoral	average value	Army cold border Brigade	Antiquity	Landscape pastoral	Army cold border Brigade
Word based	90.91	93.94	96.67	93.84	93.75	96.88	90.63	93.75
Words based	91.20	93.56	95.89	93.55	93.81	96.34	90.13	93.43

As can be seen from the results of table 2, the results of tagged words and characteristic words are almost the same, and the accuracy of tagged words is a little lower. The reason may be that the feature term based on characteristic words is too detailed for the description of the artistic conception expressed by the feature items, but it causes that the classification accuracy is not as good as the feature item based on tagged words. It can be found that the use of word based features to represent the classical poetry classification model does not bring a better accuracy. Therefore, in general, it is suggested to choose the characteristic term of the word as a unit to represent the classical poetry classification model.

Threshold Analysis

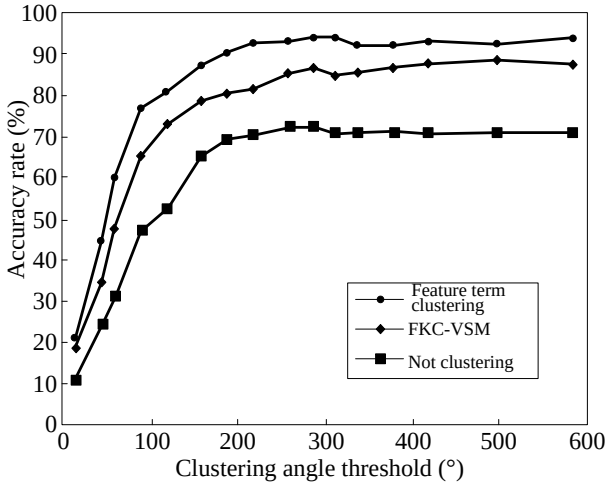
In the selection and clustering of the feature items, the number of feature items and the threshold value of the cluster angle need to be determined. In this paper, the threshold is determined according to the average accuracy of the classification and the cost of the time. In general, as the corpus is different, the threshold is different, so it is necessary to find the law of the change of the threshold and determine a general range. First of all, the overhead of execution time is mainly affected by the number of feature items. In this paper, the time cost of taking different number of characteristic items is counted, and the result is shown in Figure 6. As can be seen from figure 6, as the number of feature items increases, the cost of time increases. When the number of features is about 200, the time is about 52s; but when the feature term increases to nearly 600, the time is more than 103s, and the time is growing very fast.

Figure 6
The Time Overhead of the Number of Different Feature Items



The accuracy of the different classification models is shown in Figure 7. As can be seen from Figure 7, although the 3 curves are different classification models, the overall accuracy increases with the increase of the number of feature items; but when the number of features is more than 200, the change of accuracy begins to move smoothly. Therefore, combined with time cost and accuracy, the number of feature items in this experiment is during 200 to 300 degrees.

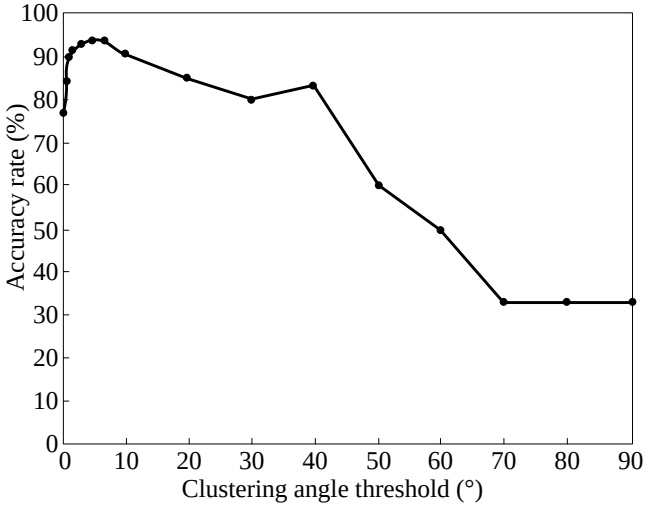
Figure 7
Accuracy Comparison Diagram of Different Classification Models



When the number of feature items is determined, the accuracy rate of different clustering angle thresholds is shown in Figure 8. As can be seen from figure 8, the accuracy of the cluster angle threshold in the interval within 10° is obviously higher than that of the other intervals, this shows that the angle of clustering is within 10°. The experimental results show that the

accuracy of the cluster angle threshold is high during 3 to 7 degrees. When the clustering angle threshold is increased, more and more features are aggregated and the accuracy rate begins to decrease. Especially when the threshold of clustering angle exceeds 70 degrees, the accuracy rate is only 30%, and the effect on classification is only low; when the threshold of clustering is very small, the accuracy of vertebra begins to decrease, this indicates that the threshold of clustering angle is too small, and the condition of the feature terms is too strict, so that the feature items which are even similar are also difficult to aggregate, and tend to be disappointed when clustering. Therefore, the range of clustering angle threshold in this experiment is 3° ~7°.

Figure 8
Comparison Diagram of the Accuracy of Different Clustering Angle Thresholds



In view of the classification model of classical poetry and artistic conception established above, the accuracy of the model was verified by classification algorithm. First of all, three different classifiers used in the process of classification experiments were introduced, the Poetry of the Tang Dynasty was taken as data set, the accuracy and recall rate of three different models were compared, so as to verify that the classification model in this paper has good effect; then the experiment for the character terms based on tagged words and characteristic words was carried out, and the conclusion that the character term based on tagged word is superior to the feature term based on characteristic words was obtained; finally, the number of feature terms and the clustering angle threshold involved in the selection and clustering of feature items were discussed, and the problem of the number of feature items and the threshold value of clusteri ng angle was analyzed carefully.

DISCUSSION

Based on the modern computer theory and technology, and combined with the characteristics of ancient Chinese prose, the thought of Confucius's humanistic education centered on the Analects of Confucius was analyzed through the classification algorithm in this paper, so as to make the computer understand poetry in a certain extent and provide a reference for related research. First of all, a detailed introduction to the classification model of ancient Chinese prose conception was given; and according to the tendency of each characteristic item in the classical poetry, the feature term was expressed as a vector representing the proportion of different categories; then based on the classical vector space model, the clustering for the feature items with similar tendentiousness was carried out, and the representation of the text model was improved,

thus representing each poem as a model based on characteristic term clustering; according to the above proposed model, the problem of poetry classification was transformed into a text classification problem, and the classification algorithm was used to classify the ancient texts; in addition, the differences among different classification algorithms on the accuracy of ancient text classification were compared, and the most suitable algorithm for the classification of poetry text was found out; at the same time, the difference between characters based on tagged words and characteristic words was compared, and the conclusion that the character item based on tagged words is better was concluded; finally, the value of the number of feature items and the threshold value of the cluster angle was analyzed, and an optimal range was obtained.

Human Subjects Approval Statement

This paper did not include human subjects.

Conflict of Interest Disclosure Statement

None declared.

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